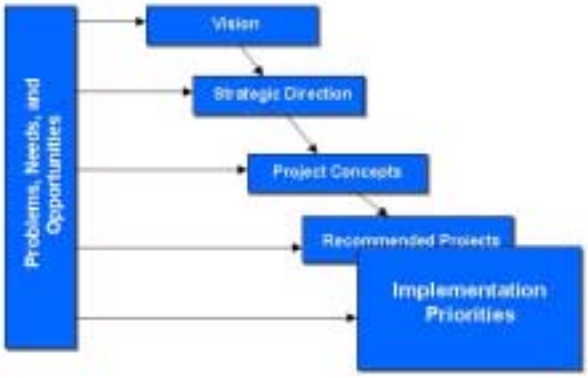
3.6 IMPLEMENTATION PRIORITIES

3.6.1 Project Evaluation



The entire Central Coast ITS Strategic Plan cannot be implemented at one time. There must be a sense of priority among potential ITS Projects so that staging and phasing can occur in a systematic manner. These priorities may vary within each individual county, based on the needs and characteristics of each area. In addition, some ITS Projects should be viewed as "core projects" or foundational to the ability to implement other projects. An indication of the relative value of various types of ITS Projects can be determined by applying a set of evaluation criteria against the recommend set of projects. This can be directly applied for those ITS Projects that are regional in scale, and indirectly applied to those ITS Projects that are more local in nature. This type of evaluation can be further used by the Central Coast agencies to develop implementation priorities for each ITS Project.

It is also important to note that some of the Central Coast RTPAs already have sets of evaluation criteria that they apply to the evaluation and prioritization of projects and programs (e.g. for prioritization for the TIP and for local funding). For ITS applications in any individual county, it may be most appropriate to use the county-level criteria for project and program evaluation, if such criteria exist. However, some of these sets of criteria do not take into consideration the non-traditional nature of ITS, and many need to be amplified to accommodate aspects of ITS. The listing below describes the set of criteria used for the Central Coast's recommended ITS Projects. The intent was not to create an exhaustive list of criteria, but a list that could be used as a reasonable guide for the ITS Steering Committee and other stakeholders.

Consistency with local goals/objectives. Does the ITS Project support the goals/objectives found in Regional/Metropolitan Transportation Plans and other planning documents?

Benefits to congestion and mobility. To what extent does the ITS Project improve traffic flow, reduce trip time, or make travel more convenient for motorists, transit users, truck drivers, etc.?

Benefits to safety (protection of life and property). To what extent does the ITS Project reduce the frequency and/or severity of accidents or improve traveler security?

Benefits to environmental quality. To what extent does the ITS Project reduce emissions or limit impacts on the environment and communities?

Benefits to tourism/economic development. To what extent is the ITS Project likely to benefit tourism, agriculture/industry, or otherwise help the economy?

Benefits to emergency preparedness. Does the ITS Project assist in helping agencies be more prepared to deal with natural disasters and emergencies?

Improvement to agency operational efficiency. To what extent does the ITS Project help agencies provide additional services without increased cost or to do more with less?

Implementation cost. What are the costs of construction and implementation?

Operating and maintenance cost. What are the costs of keeping the system running, both technologically and in terms of personnel?

Cost-effectiveness. Does the ITS Project return a good level of benefit for the investment? Is there a good expected rate of return?

Institutional feasibility. Can agencies determine who will be responsible for various aspects of the ITS Project, coordinate the effort, and make sure that it can be managed effectively?

Public acceptance and perception of benefit. Will the public be able to see that the ITS Project was a good investment of public dollars and be willing to use it in the way that it was intended? Or will their interest be distracted by controversial elements?

Proven technology (i.e. extent to which technological risk is limited). Is the development of the technology advanced enough so that there is relatively little risk of failure?

Contribution to regional benefits. Does the ITS Project provide a benefit to the regional system as a whole, or is it mainly localized?

In addition to the evaluation against the criteria, the ITS Projects have been examined against the identified problems to ensure that there is a direct connection to the problems and issues originally defined. This information is presented in detail in "Exhibit E.1 - Recommended Central Coast ITS Projects" (please refer to Appendix E).

Exhibit 3.6 provides an evaluation of the recommended ITS Projects against the criteria. The evaluation was conducted by assigning a high, medium, or low (H/M/L) priority to each ITS Project for each criterion. The rating is qualitative, based on general experience with various types of ITS applications and an understanding of the characteristics of the Central Coast. The evaluation is intended to provide general guidance and should not be taken as an exact science. To the extent possible, cost-effectiveness needs to be assessed in greater detail as specific ITS Projects move toward implementation. Costs are changing rapidly as technology changes, and cost estimation needs to be performed as close to project funding and implementation as possible to be relevant. Benefits can be approximated through the use of some of the benefit factors identified in Exhibit 1.2 or through more detailed engineering analyses conducted with data specific to the locations where an ITS Project is being implemented.

Exhibit 3.6 - Evaluation of Recommended ITS Projects Against Evaluation Criteria

(Priorities: H=High, M=Medium, L=Low)

Central Coast ITS Projects	Consistency with Goals	Benefits to Mobility	Benefits to Safety	Benefits to Environmental Quality	Benefits to Tourism/ Economic Development	Benefits to Emergency Preparedness	Improvement in Agency Operational Efficiency	Implementation Cost	Operating and Maintenance Cost	Cost-Effectiveness	Institutional Feasibility	Public Acceptance	Proven Technology	Contribution to Regional Benefits
Traffic Management and Safety														
Network Surveillance														
• CCTV	H	H	H	M	L	H	H	H	H	H	H	M	H	H
• Surveillance stations	H	H	M	M	L	H	M	H	H	H	H	H	H	H
• Smart call boxes	H	L	M	L	L	H	M	L	L	H	H	H	H	M
Surface Street Control														
• Basic Synchronization	H	H	M	H	L	M	M	L	L	H	H	H	H	M
• Central Control	H	H	L	H	L	H	H	H	H	M	M	H	M	M
Freeway Control														
• Ramp metering	M	H	H	L	L	M	L	H	H	H	M	M	H	H
HOV Lane Management														
• High Occupancy Toll (HOT) Lanes	H	H	M	H	M	M	M	H	H	H	M	M	H	H
Traffic Information Dissemination														
• Changeable message signs	H	M	H	M	M	H	M	H	H	M	M	H	H	H
• Highway advisory radio	H	M	H	M	M	H	M	M	H	M	M	H	H	H
• Portable Traffic Mgmt. System	H	M	H	M	M	H	M	L	M	H	M	H	H	M
Regional Traffic Control														
• Regional Fwy/Art. Control	H	H	M	M	L	H	L	M	M	M	L	H	L	M
• Regional Trans. Mgmt. Ctr.	H	H	M	H	L	H	H	H	H	H	H	H	H	H
Incident Management System														
• CAD System Enhancements	M	M	H	M	L	H	H	H	M	H	H	H	H	M
• Integrated Comm. System	M	M	H	M	L	H	H	H	M	H	H	H	H	H
• Call boxes	H	L	H	L	L	H	L	M	L	M	H	H	H	H
• Response Strategy Support	H	H	H	M	L	H	M	M	M	H	H	H	H	H
Emission Monitoring and Mgmt.	H	L	L	H	L	L	L	M	M	M	H	H	H	H
Standard RR Grade Crossing	M	L	H	L	L	L	L	L	L	M	H	H	H	L
Advanced RR Grade Crossing	M	L	H	L	L	L	L	H	M	M	L	H	L	L
Parking Facility Management														
• Parking usage monitoring	L	L	L	L	M	L	M	M	M	M	M	H	M	L
• Electronic parking fees	L	L	L	L	M	L	H	M	M	M	M	H	H	L
Road Weather Info System	M	M	H	L	L	M	L	M	M	M	H	H	H	H
Advanced Safety Systems														
• Advanced crosswalks	H	L	H	L	L	L	L	M	M	M	M	H	M	L
• Curve/grade warning system	H	L	H	L	L	L	L	L	M	M	M	H	M	L
Transit Management														
Transit Vehicle Tracking	H	M	L	L	L	M	M	H	M	M	H	H	H	M
Transit Fixed Route Operations														
• Off-line route/sched. Mgmt.	H	L	L	L	L	M	H	M	M	H	H	H	H	M

Exhibit 3.6 - Evaluation of Recommended ITS Projects Against Evaluation Criteria

(Priorities: H=High, M=Medium, L=Low)

Central Coast ITS Projects	Consistency with Goals	Benefits to Mobility	Benefits to Safety	Benefits to Environmental Quality	Benefits to Tourism/ Economic Development	Benefits to Emergency Preparedness	Improvement in Agency Operational Efficiency	Implementation Cost	Operating and Maintenance Cost	Cost-Effectiveness	Institutional Feasibility	Public Acceptance	Proven Technology	Contribution to Regional Benefits
Demand/Response Transit Ops														
• Automated dispatching/info	H	L	L	L	L	H	H	M	M	H	M	H	M	L
Transit Passenger and Fare Mgmt														
• Automated passenger counting	H	M	L	M	L	L	H	M	M	H	H	H	H	M
• Electronic fare collection	H	M	L	L	L	L	H	H	M	H	H	M	H	M
Transit Security														
• Video surveillance	H	L	H	L	L	L	M	M	H	M	M	M	H	L
• Voice/data communications	H	L	H	L	L	L	M	M	L	M	H	H	H	L
Transit Maintenance	H	L	L	H	L	L	H	M	L	H	H	H	H	L
Multi-modal Coordination														
• Signal priority	H	M	L	M	L	L	L	H	H	L	L	M	M	L
Transit Traveler Information														
• Static route/schedule info	H	L	L	M	M	M	H	L	L	H	H	H	H	M
• Real-time schedule info	H	L	L	M	M	M	H	H	H	M	M	H	M	M
Traveler Information														
Broadcast Traveler Information	H	M	M	M	M	H	M	M	H	H	M	H	H	H
Interactive Traveler Information	H	M	M	L	M	M	L	H	H	M	M	H	M	H
Yellow Pages and Reservation	M	L	L	L	H	M	M	M	M	H	H	H	H	H
Commercial Vehicle Operations														
Electronic Clearance	M	M	L	M	M	L	M	M	M	H	M	M	H	H
CV Administrative Processes	M	L	L	L	L	L	H	M	M	H	M	M	H	H
Weigh-in-Motion	M	M	L	M	L	L	M	H	M	H	M	H	H	H
Roadside CVO Safety	H	L	H	L	L	L	L	M	M	M	H	M	H	H
HazMat Management	H	M	H	L	L	H	L	M	M	M	H	H	H	H
Automated Dispatch Info System	H	M	L	M	M	L	H	M	M	M	M	H	M	M
Emergency Management and Enforcement														
Emergency Response	H	H	H	M	L	H	M	M	M	H	M	H	H	H
Emergency Routing														
• Signal pre-emption	H	M	H	M	L	H	L	M	L	M	H	H	H	L
• Route guidance	M	L	H	M	L	H	L	M	M	M	M	H	H	M
Mayday Support	M	L	H	L	L	M	L	M	H	M	M	H	M	M
Enforcement	H	L	H	L	L	M	M	M	M	M	M	M	M	M
Planning														
Planning Data Collection	M	L	L	L	L	H	H	M	L	H	H	H	H	H

3.6.2 The Central Coast TMC and the Caltrans 10-Year Plan – Priority Regional ITS Initiatives

One of the cornerstones of the ITS Strategic Plan for the Central Coast is the development of a Transportation Management Center and associated field devices, as stated in Section 3.3. A TMC can involve a variety of elements, but is typically associated with a situation where conditions in the field are monitored and decisions are made concerning traffic management, traveler information, incident response, and public safety. Section 3.3 indicated that the Central Coast TMC and associated devices will include a facility maintained and manned by Caltrans District 5 and CHP staff. Anticipated TMC operations include monitoring traffic conditions and incidents at strategic locations through roadway sensors and CCTV, controlling ramp meters, providing traveler information via CMS and/or HAR, and coordinating communications with CHP field officers for incident response and clearance.

Caltrans District 5 has developed a 10-Year Plan for the implementation of ITS infrastructure on the State-owned facilities in the Central Coast that would be linked to the TMC. Exhibit 3.7 presents this plan graphically, showing the currently proposed staging and potential budget outlays. Appendix G presents a more detailed description of the Caltrans District 5 10-Year ITS Plan. The plan includes freeway surveillance stations, ramp metering, CCTV, HAR, and CMS installations at the indicated locations. This possible plan is subject to modification based on Caltrans' internal phasing and funding requirements. It is not an approved plan. The short-term program focuses mainly on areas where there is more significant congestion or potential congestion, particularly Santa Barbara and Santa Cruz counties.

Also included in the plan is the implementation of the Central Coast TMC. Exhibit 3.8 presents a set of implementation and operations principles for the TMC. These principles should guide the more detailed development of the TMC and the coordination with other agencies in the Central Coast. These principles are reflected in the ITS Project description for the TMC in Appendix E.

Exhibit 3.7 – Graphical Depiction of Caltrans D5 10-Year ITS Plan

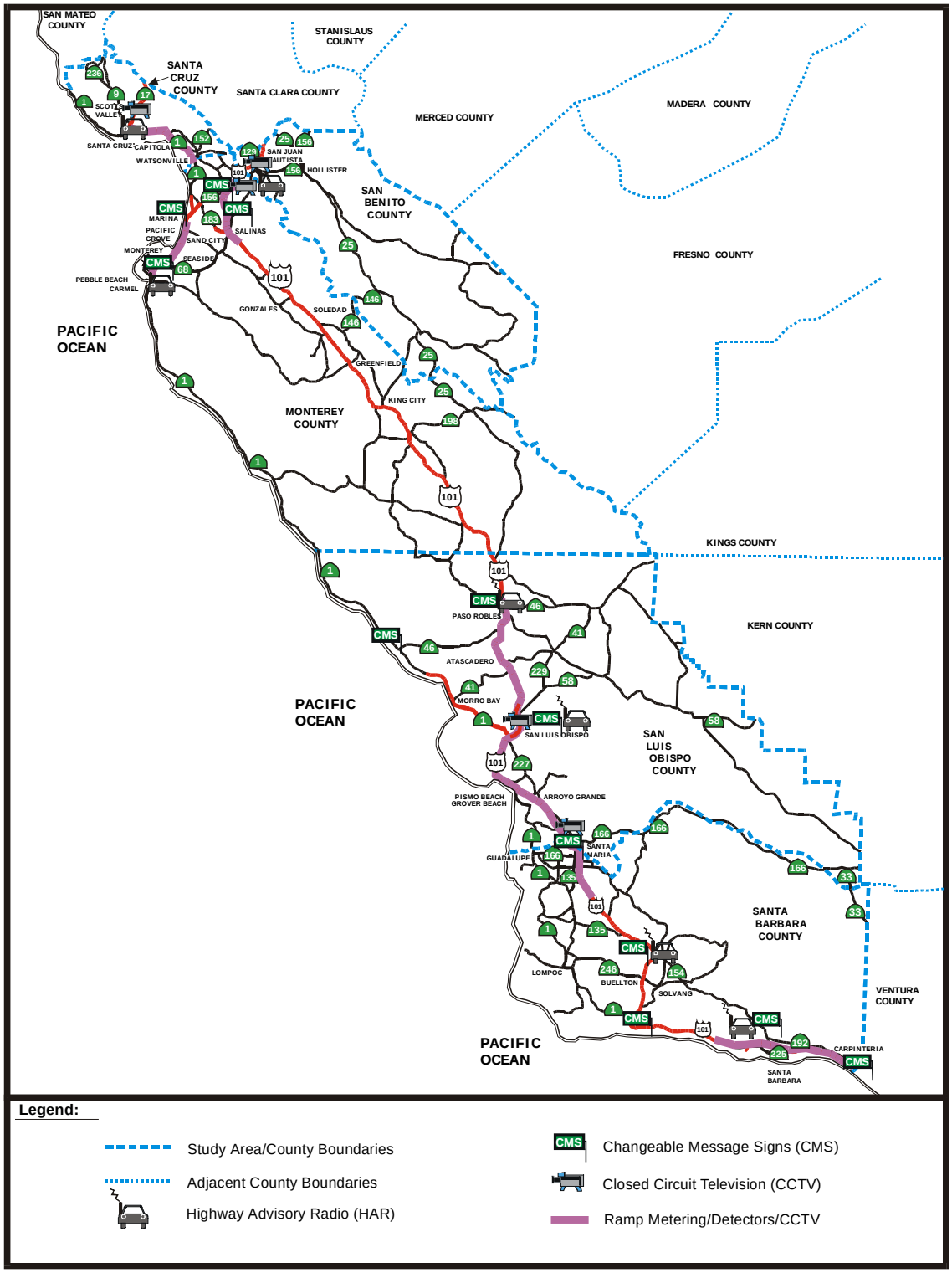


Exhibit 3.8 - Principles of TMC Implementation and Operation

Basic Principles:

- The Central Coast TMC will be jointly operated by Caltrans District 5 and CHP staff
- The purpose of the TMC is to provide a central clearinghouse facility to focus data collection, information dissemination, and operational decision-making activities in order to aggressively manage the transportation system to reduce congestion and provide for the safe and efficient movement of people, goods, services, and information in order to promote economic vitality and enhance the quality of life throughout the Central Coast
- The TMC will provide access to other agencies for selected elements or functions
- Information and operational decisions for non-state highways will rest with the owner/operator (e.g. County for county roadways, transit agency for transit operations, etc.)
- Decisions on implementation of second-tier TMCs will be at the discretion of these other operating entities
- Caltrans will proactively coordinate with local agencies to minimize impacts on the local street system
- An operations committee will be established as a vehicle for discussing state/local operational issues
- Federal, State, and Local agencies will be able to share transportation-related data/information through the joint implementation of ITS Projects and Agency-specific TMCs → therefore, State and Local TMCs will be developed with this principle in mind (e.g., one agency can transmit/receive traffic data and or CCTV images to/from other agencies as reflected in mutually agreed-upon operational policies/procedures

Proposed TMC Functionality:

- Control of ramp meters
- Control of changeable message signs (CMS) and highway advisory radio (HAR)
- Control of CCTV
- Monitoring of environmental sensors on state highways (control functions, if any, tied to project sponsor, unless other arrangements are made)
- Recommendation of diversion timing plans (not control → control still exercised by local agencies except under pre-specified plans developed jointly by Caltrans and local agencies)
- Coordinate maintenance and construction real-time traffic management activities (including lane closures)
- Coordinate special event activities
- Coordinate with Caltrans Headquarters Maintenance to update the Caltrans Highway Information Network (CHIN)
- Pursue and maintain multi-modal agency and private sector partnerships
- Provide a focal point to the media/ISPs for traveler information dissemination
- Coordinate CHP and Caltrans communications center activities (including dispatching)
- Inform other Regional TMCs (e.g., San Francisco Bay Area, Southern California, etc.) and Headquarters TMCs of major events and occurrences

Exhibit 3.8 - Principles of TMC Implementation and Operation

State Agency Functionality Issues:

- CHP will have access to CCTV (including secondary level control)
- Caltrans has exclusive responsibility for ramp meter operations and CHP for enforcement
- CHP can recommend CMS or HAR messages to Caltrans, who is responsible for implementation
- Caltrans District 4 will have primary responsibility for state highways with commuting patterns to the San Francisco Bay Area from Santa Cruz County (primarily SR 17 and portions of SR 1)
- The Caltrans District 4 TMC (Bay Area) will have the capability to perform Central Coast TMC operations during times when CHP/Caltrans District 5 staff are unavailable
- The Caltrans District 7 TMC (Southern California) will be interfaced with the Central Coast TMC and will have second-tier responsibility for Santa Barbara County, should CHP/Caltrans District 5 staff be unavailable

Local Agency Functionality Issues:

- Local agencies have access to camera viewing, not control
- Traffic congestion map will be available on Internet
- Camera images will be available on Internet
- Portable traffic management systems will be controlled by the owner
- Portable traffic management units will have the potential for operation from remote locations by the unit owner or from the Central Coast TMC
- Other types of information dissemination (i.e., special events) will be the responsibility of the event sponsor
  - The TMC will have the capability to receive input from information providers and to make the information available to agencies with connections to the TMC
  - Maximum use will be made of the internet as the communications linkage
- Access to the Central Coast TMC will be provided either through dial-up computer terminals at individual agencies or through the Internet
  - These interfaces need to be designed to maximize security and operational integrity of all systems
- The Central Coast TMC will integrate systems and coordinate activities with local transit, law enforcement, and other emergency service agencies

3.6.3 Priority ITS Projects in Santa Cruz County

The activities listed below represent the highest priority ITS Projects in Santa Cruz County. Implementation of these projects will depend on the availability of funding and initiative taken by the project sponsors.

- Dynamic traffic and incident management strategies (ramp metering and freeway/arterial coordination) on SR 1 and SR 17 to help provide congestion relief, including the possibility of High Occupancy Toll (HOT) lanes
- Transit vehicle tracking and information systems, including information at strategically located kiosks
- An upgraded communications network to enable improved signal coordination
- Parking management and information systems for the Santa Cruz Boardwalk area

3.6.4 Priority ITS Projects in San Benito County

The activities listed below represent the highest priority ITS Projects in San Benito County. Implementation of these projects will depend on the availability of funding and initiative taken by the project sponsors.

- Installation of motorist aid call boxes along US 101, SR 25, and SR 156
- Upgrades to traffic signal systems to improve signal coordination
- Safety treatments on SR 156
- Traveler information systems (CMS and/or HAR) along US 101, SR 25, and SR 156

3.6.5 Priority ITS Projects in Monterey County

The activities listed below represent the highest priority ITS Projects in Monterey County. Implementation of these projects will depend on the availability of funding and initiative taken by the project sponsors.

- Installation of motorist aid call boxes along US 101, SR 1, and SR 68 with particular sensitivity given to the visual aspects any installations along scenic roadways
- Traveler information systems (CMS and/or HAR) along US 101, SR 1, SR 68, and SR 156
- Upgrades to traffic signal systems to improve signal coordination
- Use of transit vehicle tracking systems to support transit operations
- Safety applications on rural highways
- A truck information service in the Salinas area to optimize freight routing and management

3.6.6 Priority ITS Projects in San Luis Obispo County

The activities listed below represent the highest priority ITS Projects in San Luis Obispo County. Implementation of these projects will depend on the availability of funding and initiative taken by the project sponsors.

- Transit vehicle tracking systems and "smart card" technologies (similar to those anticipated in Santa Barbara)
- Traveler information systems (CMS and/or HAR) along US 101, SR 1, and SR 46
- Upgrades to traffic signal systems to improve signal coordination and provide traffic signal priority/pre-emption for emergency vehicles
- Portable traffic management systems (PTMS) for use during construction projects and at major events such as the Cuesta Grade reconstruction, mid-state fair, and other events
- Advanced pedestrian crosswalks in downtown San Luis Obispo to improve intersection safety

3.6.7 Priority ITS Projects in Santa Barbara County

The activities listed below represent the highest priority ITS Projects in Santa Barbara County. Implementation of these projects will depend on the availability of funding and initiative taken by the project sponsors.

- Several transit-oriented projects are listed: Automatic Vehicle Location (AVL – systems that track bus locations at any given moment), transit information systems, management systems, and maintenance systems to improve system efficiency

- Upgrades to traffic signal systems to improve the efficiency of traffic flow on arterial streets
- A trip planning system (the Santa Barbara County Trip Planner) that piggybacks on a system already functioning at the Southern California Association of Governments

- Travelers information system (CMS and/or HAR) along US 101, SR 1, and SR 154 that would provide notification of major incidents, road closures, slides, and weather conditions
- Dynamic traffic and incident management strategies (ramp meters and freeway/arterial coordination) on US 101 in Santa Barbara and Santa Maria, to help provide congestion relief (in conjunction with Caltrans

3.6.8 Lead and Support Agencies

In general, agencies should be responsible for implementation for the facilities that they own or for which they already have responsibility. Caltrans would be expected to have responsibility for ITS Projects on state highways, local transportation departments would be expected to have responsibility for ITS Projects on local roadways, and transit agencies would be expected to have responsibility for transit projects. However, an increasing level of integration of ITS components will require agencies to examine whether there should be exceptions to this general owner-operator rule. A good example would be where a local or multi-agency transportation management center is envisioned, which could include the capability for freeway/arterial diversion. Likewise, coordination of signals across jurisdictional boundaries may require one jurisdiction assuming some degree of responsibility for operation of another agency's signals.

Exhibit 3.9 illustrates possible agency responsibilities for the ITS Projects. The responsibilities are designated as lead agency (L) or support agency (S). Local agencies are grouped in generic categories, not by individual county. A county that is not implementing a particular type of ITS Project would not be in either a lead or support agency role. The selection of lead agency is important not just for implementation and operations, but for pursuit of funding as well. Although there could be exceptions as to which agency should lead funding versus implementation/operations, it is expected that the vast majority of ITS Projects should have the same lead agency for all elements of the project life cycle.

As testimony to the coordination intended between lead and support agencies, any ITS Project on state highways will be developed in tandem with local ITS Projects to the greatest extent possible. For example, an ITS Project such as ramp metering should not be actually deployed without first undertaking a comprehensive Feasibility Study to determine the benefit and impact that such a project would have on the highway and/or local streets. A further example would be the use of CMS to direct traffic to local arterial streets without the CMS first being installed as part of a coordinated Incident Management system or until the local streets are equipped to handle the diverted traffic.

To the extent possible, there should also be continuity in the personnel involved in guiding the ITS Project. Although the ITS Project may pass through more than one division of the agency, keeping the project vision clearly in focus throughout the effort is essential. The most successful ITS Projects have typically been those for which there has been continuity of staff over a long period of time. These staff have been able to maintain the vision to ensure that the original objectives of the ITS Project were actually achieved.

Exhibit 3.9 indicates that the owners of the facilities are typically best suited to be the lead agency. In some cases, though, particularly in later projects, there is the potential for sharing lead agency responsibility. This would be particularly true with a single project that covers multiple cities or both city and state facilities. The primary opportunity for involvement of the private sector is in traveler information functions, such as the regional traveler information system.

Exhibit 3.9 - Lead and Support Agencies (L=lead, S=support)

Central Coast ITS Projects	Caltrans District 5	Caltrans Headquarters	CHP	RTPAs/MPOs/CTCs	Local Public Wks/Trans.	Local Law Enf./Em. Svc.	Transit Agencies	Trucking Industry	Business Community	Event Mangers	Tourism Associations
Traffic Management and Safety											
Network Surveillance –											
• CCTV	L	S	S	S	S	S				S	
• Surveillance stations	L	S	S	S	S	S				S	
• Smart call boxes	S			L	S	S				S	
Surface Street Control											
• Basic Synchronization	L				L				S		
• Central Control					L				S		
Freeway Control											
• Ramp metering	L	S	L	S	S	S					
HOV Lane Management											
• High Occupancy Toll (HOT) Lanes	L	S	S	S	S	S			S		
Traffic Information Dissemination											
• Changeable message signs	L	S	S	S		S		S			
• Highway advisory radio	L	S	S	S		S		S		S	
• Portable Traffic Mgmt. System	L	S	S	S	L	S					
Regional Traffic Control											
• Regional Fwy/Art. Control	L	S	L	S	L	S					
• Regional Trans. Mgmt. Ctr.	L	S	L	S	S	S	S		S		
Incident Management System											
• CAD System Enhancements			L			L					
• Integrated Comm. System			L			S					
• Call boxes			L	L	S	S					
• Response Strategy Support	L		L	S	S	S					
Emission Monitoring and Mgmt.				L							
Standard RR Grade Crossing	L				L	S		S			
Advanced RR Grade Crossing	L				L	S		S			
Parking Facility Management											
• Parking usage monitoring				S	L		S		S	S	S
• Electronic parking fees				S	L		S		S	S	S
Road Weather Info System	L	S	S		L	S					
Advanced Safety Systems											
• Advanced crosswalks	L		S	S	L	S					
• Curve/grade warning system	L		S	S	L	S					
• Height detectors	L		S		L	S		S			
Transit Management											
Transit Vehicle Tracking				S			L				
Transit Fixed Route Operations											
• Off-line route/sched. Mgmt.				S			L				

Exhibit 3.9 - Lead and Support Agencies (L=lead, S=support)

Central Coast ITS Projects	Caltrans District 5	Caltrans Headquarters	CHP	RTPAs/MPOs/CTCs	Local Public Wks/Trans.	Local Law Enf./Em. Svc.	Transit Agencies	Trucking Industry	Business Community	Event Mangers	Tourism Associations
Demand/Response Transit Ops											
• Automated dispatching/info				S			L				
Transit Passenger and Fare Mgmt											
• Automated Passenger Counting (APC)				S			L				
• Electronic fare collection				S			L				
Transit Security											
• Video surveillance					S	S	L				
• Voice/data communications					S	S	L				
Transit Maintenance							L				
Multi-modal Coordination											
• Signal priority	S			S	L		S				
Transit Traveler Information											
• Static route/schedule info				S			L				
• Real-time schedule info				S			L				
Traveler Information											
Broadcast Traveler Information	S		L	L		S	S		S	L	
Interactive Traveler Information	S		L	L		S	S		S		L
Yellow Pages and Reservation				S							L
Commercial Vehicle Operations											
Electronic Clearance	S	L	L					S			
CV Administrative Processes	S	L	L					S			
Weigh-in-Motion	S	L	L					S			
Roadside CVO Safety	L	S	L					S			
HazMat Management	S		L					S			
Automated Dispatch Info System	S			S	L			S			
Emergency Management and Enforcement											
Emergency Response	S		L	S	S	L					
Emergency Routing	S		L	S	S	L					
• Signal pre-emption			L	S	S	L					
• Route guidance			L	S	S	L					
Mayday Support			L	S		L					
Enforcement			L	S	S	L					
Planning											
Planning Data Collection	S	S		L	L		S				

It is absolutely essential that lead agencies think through the implications of operating and maintaining the systems for which they would be responsible. A commitment to maintenance must be present for the ITS Project to succeed. Electronics and communications systems always require attention, and credibility will be easily lost if systems are poorly maintained. In addition, some ITS Projects may require dual lead agencies to deal with various parts of the implementation process. For example, call boxes are generally an initiative at the County level, but the CHP is responsible for answering calls.

3.6.9 Interaction With the Private Sector

ITS is not just a public agency program. In fact, there is a need to actively pursue private sector participation in certain areas of ITS, due to funding limitations and to the fact that much of the responsibility for ITS (e.g. in-vehicle systems) is in the hands of the private sector. In addition to the manufacture and sale of in-vehicle devices and other products, one of the principal areas of opportunity for private sector involvement is in traveler information. Information generated by public sector systems can be readily obtained and re-packaged for particular audiences. Use of the Internet is a logical and cost-effective method of sharing information, both with the public, among agencies, and with private sector operators. The Central Coast ITS Strategic Plan encourages agencies to make creative use of the Internet in sharing information at all these levels. Other initiatives that may be considered with the private sector include:

- Providing links to and from a range of web sites in which travelers may have interest (e.g. web sites promoting Central Coast tourism)
- Making real-time traffic data, video displays, and other traffic-related information available to private information service providers → these could include the media, commercial traffic reporting services or other private entrepreneurs
- Soliciting interest from companies that could benefit from providing motorist aid services, such as auto dealerships and manufacturers
    - Facilitating the adoption and functioning of "mayday" technology
    - Encouraging the providers of wireless communications to completely cover roads in the Central Coast Region
- Assisting other entrepreneurs who have ideas for improved traffic management or travel information dissemination that are compatible with the missions of the various Central Coast agencies

3.6.10 A Word About ITS Communications

Communications systems are at the core of allowing ITS to operate. They are the enablers of the architecture and the flow of information within that architecture. This technological area is also the realm in which some of the greatest strides and fastest progress is being made. One need only look at the last several years of explosion in Internet applications to understand how rapidly things can change. In light of the magnitude and pace of change, the following general principles should be used in building the communications infrastructure for ITS in the Central Coast.

Commitment. Do not prematurely commit to a communications technology. It may quickly be outdated or superseded.

New Developments. Attempt to foresee developments that could have a significant impact on the cost of ITS implementation. For example, the emerging ability to access the Internet through wireless communications, and the ability of hand-held devices (e.g. cell phones, pagers, and palm computers) to receive information will likely revolutionize the way in which information is delivered to moving vehicles and individuals.

Functionality. For the ITS Strategic Plan, think in terms of the function of communications. When it comes time to commit to a technology, conduct a communications analysis that provides for the most cost effective alternative at that point in time, and leave flexibility to grow or take advantage of developments in the future.

Wireless Communications. Given the trends toward greater use of wireless communications, promote investment by the private sector in greater coverage and capacity of areas in the Central Coast, including rural areas.

Communications Expert. Maintain currency of understanding of developments in communications technology so that the best decisions can be made. The Central Coast should maintain access to at least one communications expert, either through Caltrans, CHP, an Information Technology branch of a local government, or a university. This could be someone who serves as a statewide resource, or someone who focuses on the Central Coast.

Internet. Given the availability of the Internet as a ready-made communications medium, use it to the maximum extent possible. Use of the Internet for communications should be the first avenue explored prior to investing in dedicated communications technologies. This will ensure that maximum use will be made of the many millions of dollars already invested by both the

public and private sector in information that is available on the Internet. Security issues and required data transmission rates will play heavily into whether and the extent to which Internet applications are practical.

Standards. Ensure that applications comply with national communications standards to maximize the inter-operability of the ITS applications.

As indicated above, the communications infrastructure will support the implementation of the overall architecture. Some of the key elements of the communications system are expected to be as follows. These are not based on a specific communications analysis, but on the recognized need to minimize implementation and maintenance costs, if applications are to be cost-effective and sustainable in the Central Coast over the long-term.

TMC Communications. To the extent possible, implement systems in a way that minimize the amount of communications required to the Central Coast TMC. This typically involves systems that are more distributed in nature (rather than centralized). Dial-up communications from the TMC to the field masters (where information is collected and analyzed locally) will generally allow communications costs to be minimized, especially when considering the large area involved in the Central Coast. However, certain types of information may require continual monitoring at the TMC, and the appropriate communications mechanism for this will need to be explored in a way that minimizes cost.

Communications Alternatives. Explore alternatives to wireline communications. Even though the available bandwidth may be greater with wireline communications, it represents one of the largest portions of the potential cost of implementing ITS. Perhaps even more importantly, it requires maintenance of the installed network, which can become a significant expense especially in areas where future construction could take place. Wireless communications offers flexibility and increasing functionality.

Coordination. Where possible, piggyback ITS communications on other agency communications infrastructure already in place or planned for the future. Multiple uses of agency radio systems, especially when upgraded to digital, make economic sense. Project lead agencies should explore these possibilities with potential partner agencies that also have communications needs. This could include, for example, transit agencies, public works departments, and emergency service agencies. A communications "summit" may be appropriate in each county and/or in the region to explore opportunities of mutual interest among agencies.

CHP Initiatives. Promote the CHP and local emergency services to upgrade communications systems or other advanced technologies that allow for direct field-to-field communications. As funding for this is being explored, investigate the possibilities of piggybacking device communications as well as voice communications into these or other appropriate systems.

3.6.11 ITS Project Cost Analysis

Determining ITS Project costs at this stage of the deployment process is difficult for a number of reasons. In some instances, the ITS Project will be several years away, and the technologies and associated costs may change radically. In others, the associated approaches to the communications systems may change, depending on developments in the communications industry. In addition, similar ITS Projects in different jurisdictions will be of varying size and complexity, so a "one-cost-fits-all" approach will not work.

Despite these challenges, the Region's Federal, State, and Local agencies are looking to the Central Coast ITS Strategic Plan to assist them in planning and estimating the deployment costs associated with identified ITS Projects. With these financial guidelines in-hand, each Agency is better poised to gather more specifics about the ITS Project and prepare better cost estimates for inclusion into State and County-level project programming documents.

Exhibit 3.10 provides an estimate of costs by ITS Project. As seen from Exhibit 3.10, the project deployment process is broken-down into distinct phases to provide each Agency with an understanding of what it really takes to deploy an ITS Project. Please note the following items when reviewing the costs presented in Exhibit 3.10:

- All costs presented are intended as planning-level estimates, not engineering estimates
- Better estimates can be provided as each ITS Project moves into design and procurement
- All cost estimates are provided at the component level approach (i.e., per vehicle, per location, etc.)
    - Provides more detail to the interested Agency due to its "bottoms-up" approach
    - Normalizes the effect of different spacing of the components along the roadway or a different number of vehicle in a fleet

- Capital Costs provided are based on real-world experience and notably accurate
- Other project phase costs are estimates (i.e., rule-of-thumb) based on a percentage of the Capital Cost:
    - Project Administration → 10%
    - Requirements and Design → 15%
    - Installation and Integration → 15%
    - Testing and Evaluation → 10%
    - Operations and Maintenance → 10% per year
- Costs for communications and construction activities are not included within this cost analysis
    - These costs can vary widely depending upon the project's deployment location, the amount of existing infrastructure already in-place, and the specific design details associated with the ITS Project
    - These costs are substantial components of the ITS Project's entire deployment cost, often 40-50% of the total cost

For those ITS Projects where Capital Costs are not provided, the desired level-of-accuracy could not be maintained. Therefore, the reader is referred to the individual ITS Project description in Appendix E for further information concerning applicable cost range(s) based on real-world experiences.

Please note that the costs in Exhibit 3.10 and Appendix E provide a starting point and possible baseline for future ITS deployment costs applicable to the Central Coast Region. The reader is cautioned about using the costs directly without first examining the assumptions, local conditions, and other factors associated with the particular project.

Exhibit 3.10 – Central Coast ITS Project Cost Analysis

Central Coast ITS Project	Capital Cost (per unit)	Project Admin. (10%)	Reqs. & Design (15%)	Installation & Integration (15%)	Testing & Evaluation (10%)	Total Cost	O&M (per year) (10%)	Comments
Traffic Management and Safety								
Network Surveillance • CCTV • Surveillance stations • Smart call boxes	 $40,000 $30,000 $6,000	 $4,000 $3,000 $600	 $6,000 $4,500 $900	 $6,000 $4,500 $900	 $4,000 $3,000 $600	 $60,000 $45,000 $9,000	 $4,000 $3,000 $600	 Per camera Per location Per location
Surface Street Control • Basic Synchronization • Central Control	 $250,000	 $25,000	 $37,500	 $37,500	 $25,000	 $375,000	 $25,000	See Appendix E System costs only
Freeway Control • Ramp metering	$55,000	$5,500	$8,250	$8,250	$5,500	$82,500	$5,500	Per location
HOV Lane Management • High Occupancy Toll (HOT) Lanes								See Appendix E
Traffic Information Dissemination • Changeable message signs • Highway advisory radio • Portable Traffic Mgmt. Sys. (CMS, HAR, & CCTV)	$200,000 $50,000 $130,000	$20,000 $5,000 $13,000	$30,000 $7,500 $19,500	$30,000 $7,500 $19,500	$20,000 $5,000 $13,000	$300,00 $75,000 $195,000	$20,000 $5,000 $13,000	Freeway-type CMS Per location Per PTMS
Regional Traffic Control • Regional Trans. Mgmt. Ctr.								See Appendix E
Incident Management System • Call boxes • Response Strategy Support	$4,000	$400	$600	$600	$400	$6,000	$30,000[2]	Per location See Appendix E
Standard RR Grade Crossing	$55,000	$5,500	$8,250	$8,250	$5,500	$82,500	$5,500	Per location
Advanced RR Grade Crossing	$75,000	$7,500	$11,250	$11,250	$7,500	$122,500	$7,500	Per location
Parking Facility Management • Parking usage monitoring	$125,000	$12,500	$18,750	$18,750	$12,500	$187,500	$12,500	Per location
Road Weather Info System	$45,000	$4,500	$6,750	$6,750	$4,500	$67,500	$4,500	Per location
Advanced Safety Systems • Advanced crosswalks • Curve/grade warning system	 $30,000 $70,000	 $3,000 $7,000	 $4,500 $10,500	 $40,000[1] $10,500	 $3,000 $7,000	 $80,500 $105,000	 $3,000 $7,000	 Per crosswalk Per location

Central Coast ITS Project	Capital Cost (per unit)	Project Admin. (10%)	Reqs. & Design (15%)	Installation & Integration (15%)	Testing & Evaluation (10%)	Total Cost	O&M (per year) (10%)	Comments
Transit Management								
Transit Vehicle Tracking • AVL (vehicle) • AVL (system)	 $15,000 $500,000	 $1,500 $50,000	 $2,250 $75,000	 $2,250 $75,000	 $1,500 $50,000	 $22,500 $750,000	 $1,500 $50,000	 Per transit vehicle Includes training
Demand/Response Transit Ops • Automated dispatching/info								 See Appendix E
Transit Passenger and Fare Mgmt • Automated pass. counting • Electronic fare collection	 $5,000 $10,000	 $500 $1,000	 $750 $1,500	 $750 $1,500	 $500 $1,000	 $7,500 $15,000	 $500 $1,000	 Per transit vehicle Per transit vehicle
Transit Security • Video surveillance • Voice/data communications	 $10,000	 $1,000	 $1,500	 $1,500	 $1,000	 $15,000	 $1,000	 See Appendix E Per transit vehicle
Multi-modal Coordination • Signal priority (vehicle) • Signal priority (intersection)	 $2,000 $2,500	 $200 $250	 $300 $375	 $300 $375	 $200 $250	 $3,000 $3,750	 $200 $250	 Per transit vehicle Per intersection
Transit Traveler Information • Static route/schedule info • Real-time schedule info								 See Appendix E See Appendix E
Traveler Information								
Broadcast Traveler Information								See Appendix E
Interactive Traveler Information								See Appendix E
Commercial Vehicle Operations								
Electronic Clearance								See Appendix E
CV Administrative Processes								See Appendix E
Weigh-in-Motion								See Appendix E
Roadside CVO Safety								See Appendix E
HazMat Management								See Appendix E
Emergency Management and Enforcement								
Emergency Response								See Appendix E
Emergency Routing • Signal pre-emption (vehicle) • Signal pre-emption (int.)	 $2,000 $5,000	 $200 $500	 $300 $750	 $300 $750	 $200 $500	 $3,000 $7,500	 $200 $500	 Per transit vehicle Per intersection
Mayday Support								See Appendix E